AD-A149 078 AN ELECTRO-OPTIC SPATIAL LIGHT MODULATOR FOR THERMO-ELASTIC GENERATION OF..(U) BECKMAN INSTRUMENTS INC CARLSBAD CALIF* 27 JUL 84 SDL-84-2361-01 1/1

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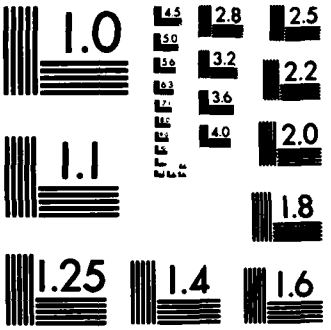

AN ELECTRO-OPTIC SPATIAL LIGHT MODULATOR FOR THERMO-ELASTIC GENERATION OF PROGRAMMABLY FOCUSED ULTRASOUND

Contract Number N00014-84-C-0058

SDL No. 84-2361-01

27 July 1984

"The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the Defense Advanced Research Projects Agency or the U.S. Government."

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"AN ELECTRO-OPTIC SPATIAL LIGHT MODULATOR FOR THERMO-ELASTIC GENERATION OF PROGRAMMABLY FOCUSED ULTRASOUND"

The objective of the program is to produce a device which is capable of converting light energy into ultrasound energy and, by suitable coupling to a solid or liquid target, produce a focusing of the sound within the target.

The concept was first developed theoretically at Spectron Development Laboratories, Inc., and methods for implementing were proposed by the original principal investigator, Dr. J. L. Doty. Shortly after completing the development of the theoretical analysis, Dr. Doty left SDL with the experimental part of the program left to be accomplished.

I took over the program as principal investigator and requested a three month extention of the contract to allow time to review and continue the work. If granted, this now extends the end date to 15 September 1984.

The next interim technical report will be submitted on 15 August and a final report of 15 September.

The proposed method is to couple optical energy into a solid or liquid target in an annulus of rapidly varying but controllable radius. We have shown analytically that this can provide a focused sound wave of focus distance which is completely controllable simply by changing the rate at which the annulus radius varies.

The task then becomes one of implementation. An optical device is required to produce annular rings of light with a time varying (and

controllable) radius. We produced the designs for three optical elements by which this could be achieved.

(1) An intra-cavity modulator using KDP* crystals of special construction. The modulator acts as a Q-switch which Q-switches an annular portion of a ruby laser which has a time varying radius.

(2) A Twyman-Green Interferometer with phase control in one leg. The interferometer produces a single circular interference fringe which collapses into zero radius.

(3) A combined zone plate and mode locked ruby laser which illuminates discrete annular rings at a controlled timing.

All three methods appear feasible from an analytical point of view. However, we arrived at a number of conclusions.

(1) We could not find a vendor who could manufacture the first who would commit to required specifications.

(2) The second was designed and partially assembled. However, because of the properties of ruby lasers, it could not be implemented with ruby. A dye laser will be required. Unfortunately the program has not been scoped for such an acquisition.

(3) The third approach was adopted since it does demonstrate the concept and since it can be implemented with existing equipment.

The system was assembled and the experiment is currently underway. Preliminary results are excellent. These will be reported in the next interim technical report.

SDL PROJECT PLAN AND REVIEW

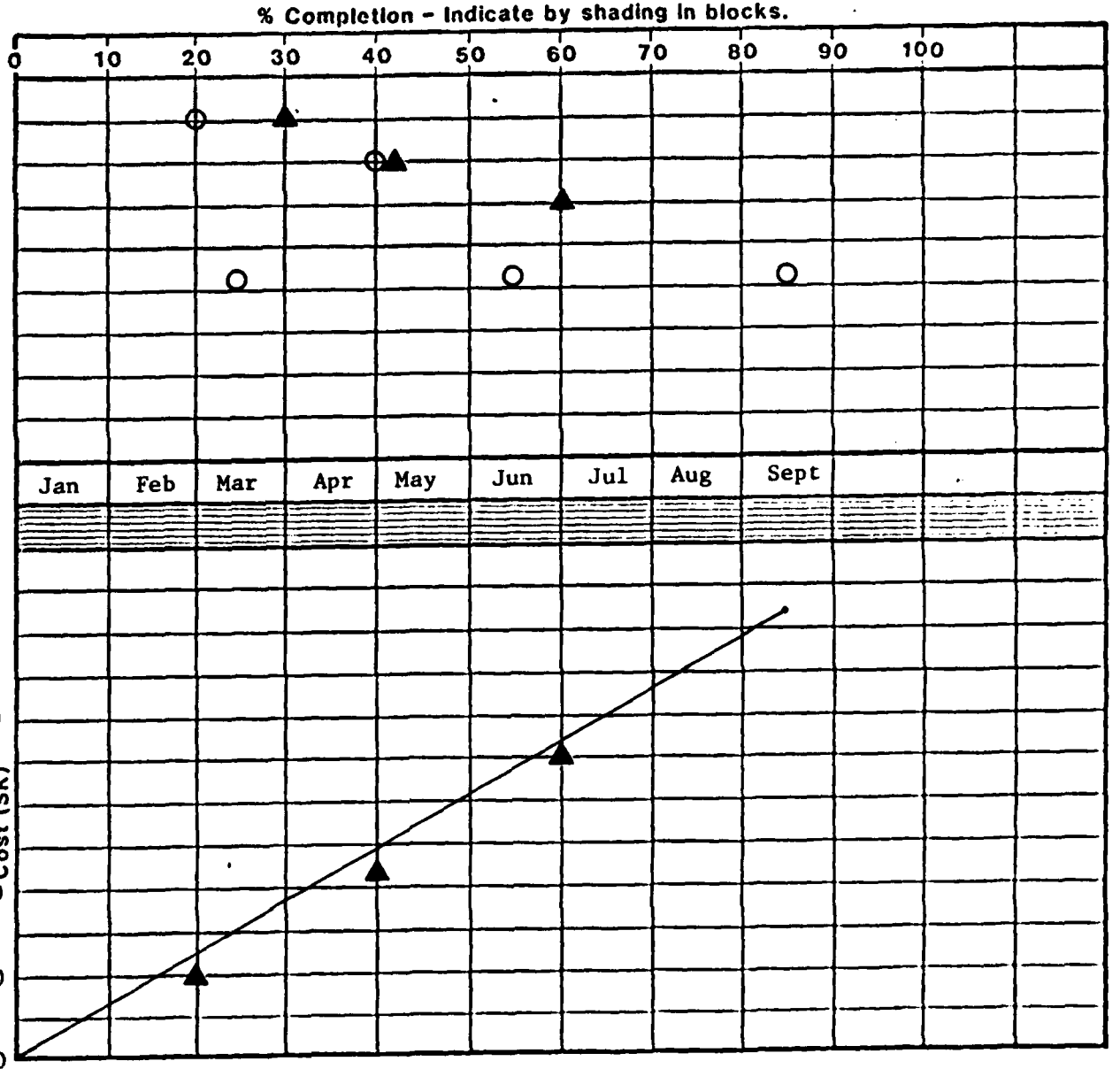
Project No./Title: N00014-84-C-0058/E-O Spatial Light Modulator
P.I.: J. D. Trolinger
Contract Amount: $52,383
Target Cost: $48,168 (8.75% Fee)
Target MOC:
Target Labor:
Start Date: 15 Dec. 1983
End Date: 15 June 84/15 Sept. 84

Projected: ○ or ——
Actual: ▲ or - - - -

% Completion - Indicate by shading in blocks.

PROJECT ELEMENTS
1. EOSLM Design
2. Fabrication & Testing
3. Experiment Design
4. Experiment Conduct
5. Reporting

DELIVERABLES	Dates Planned/Actual
Int. Report	15 Mar / 30 Jul
Int. Report	15 Jun
Final Report	15 Sept



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